

EM433 - Computer-Aided Manufacturing
IDEAS Generative Machining Workshop Exercise

Assignment: Use I-DEAS to generate the NC machining code to machine either the Roller Guide (lathe) or the Mill Block (mill). The required solid models for each job are stored in the library, **CAM Lab Parts**, under the project **EM433-CAM**.

1. Use the Generative Machining Task in I-DEAS to build a manufacturing assembly and specify each of the processes necessary to machine the part.
2. Prepare a TSD Work Request, including all necessary drawings, that details the instructions for manufacturing the part.
3. Submit your completed Work Request, including a listing of the NC tape file, to Prof. Link for approval.
4. Once the Work Request has been approved, submit it to Mr. Price in the Machine Shop.
5. Make arrangements with the machinist assigned to your job to witness the machining of your part.
6. Submit the completed job to Prof. Link for a grade.
7. Due by _____

Mill Block

Mill Block: Check *copies* (No notification) of the following parts out of the library:

2 x 2 x 4-1/2 stock
Mill block
Step-Jaw Vise
Mill Table

These parts will be placed in your bin. You can now proceed to follow the steps in the handout to generate the toolpaths to machine the part.

Use the following sequence of operations to machine the part:

Face Mill the upper surface with the 3 in. face mill
Volume Clear the region around the boss with the 1 in. end mill
Volume clear the pocket and the slot with the 3/8 in. end mill
Profile the slot with the 3/8 in. end mill
Profile the pocket with the 1/4 in. end mill
Profile the outside of the part and the boss with the 1 in. end mill
Drill the 1/4 in. holes with the 1/4 in. drill
Drill the 3/8 in. hole with the 3/8 in. drill

Roller Guide: Check *copies* (No notification) of the following parts out of the library:

1-1/2 bar stock
roller guide
Lathe Collet Chuck

The procedures for turning are generally the same as for milling, except that the tool definition is a little trickier. There is a catalog of tools called **CAM Tools** under the project **EM433-CAM** that you can get to by selecting *Find...* when you are defining a tool. Three useful turning tools that will get the job done for you are:

35TT-L	A 35 degree diamond turning tool, left-hand cutting, for facing and turning
60THR-A	A 60 degree threading tool for cutting threads, right-handed
GR-L	A 1/8 in. diameter grooving tool for cutting off the finished part

Additional notes on Turning operations:

1. Before defining any operations, select the *Define Features* icon (under the Add Operation icon, 2nd row, 3rd col.) and define any thread or groove features on the part. For the roller, you need to define the 0.5 in. dia. cylindrical region as being a thread and specify that it is a 0.5 in. nominal dia, 13 threads per inch, UN series, Class 2A.
2. When selecting tools from the catalog, be sure to check the following parameters under the *Attributes...* button of the *Tool Specification* form, *Tool Station Attributes*. The *Tool Control Point X Offset* should be set for *Touch Off*, likewise for the Z offset. The *Offset Register* and the *Cutter Compensation Register* should both be set to the same value as the *Tool Station* parameter.
3. Use these suggestions when setting the cutting parameters for turning operations.
 - Cut...* Be sure to check the boxes for *Machine undercuts on dia, and faces*.
 - Feeds...* Set the feeds for *X, Combo* and *Z* cuts to 0.010 IPR for roughing operations and around 0.003 IPR for finishing operations.
 - Speeds...* Set the cutting speed to 1500 to 2000 CSFM for roughing and finishing operations.
4. When cutting threads with the 60THR-A tool, you must adjust a few parameters on the *Tool Station Attributes* form. Check the box to *Mount Tool Upside Down* and also set spindle rotation to *Counter-clockwise*. When setting the cutting parameters for the threading operation, set the *infeed distance* to 0.5 in.
Also, when you select *Generate thread passes*, add a spring pass to the operation.
5. Cutting parameters for threading: Speed=1000 RPM
Cutting parameters for Cutoff operation: Speed=1500 RPM
Feed = 0.003 IPR